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ASTRONOMICAL OBSERVATIONS IN 1911.

Made by TORVALD KÖHL, at Odder, Denmark.

VARIABLE STARS.

(The instrument used is a 3-inch Steinheil, power 42.)

S *Ursæ Majoris.*[1]

Jan. 1: S 4 steps < e.
10: 2 steps < e.
19: = e.
23: id.
28: id.
29: id.
Feb. 1: id.
5: 1-2 steps > e.
7: 1 step > d.
19: 3 steps > d.
24: id.
27: 4 steps > d.
Mar. 5: half way between c and d.
8: 4 steps < c.
19: 2 steps < c.
20: id.
25: 3 steps < c.
26: id.
31: id.
Apr. 1: 3 steps > d.
8: 2 steps > d.
14: = d.
May 7: 4 steps < e.
22: = g.
26: id.
July 23: id.
July 28: > g.
< f.
30: = f.
Aug. 7: 3 steps > f′.
12: 3 steps < e.
19: 2 steps < e.
23: = c.
Sept. 2: = e.
4: < d.
= d.
7: 1 step < d.
11: id.
14: = d.
16: 1 step < d.
25: = d.
29: id.
Oct. 4: 1 step > d.
8: 3 steps > d.
10: id.
16: 2-3 steps > d.
18: 3 steps > d.
19: id.
28: 4 steps > d.
Nov. 1: 4 steps < c.
10: id.
21: = d.
Dec. 23: = f.

T *Ursæ Majoris.*[2]

Jan. 1: T < e.
> f.
10: invisible ☾.
19: id.
23: 3 steps < g.
Jan. 28: invisible.
29: id.
Feb. 1: id.
5: id.
7: id.

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[1] Vide the sketch in the *Publications A. S. P.*, No. 73, **12**, 56.

[2] Vide the sketch in the *Publications A. S. P.*, No. 22, **4**, 63.

Feb. 19: id.
24: id.
27: 11 magn.
Mar. 5: id.
26: invisible.
31: id.
Apr. 1: id.
8: id.
May 7: id:
22: 2 steps < g.
26: { > f.
< e.
June 3: { < b.
> c.
July 11: 6 steps > a.
23: 4 steps > a.
28: 3 steps > a.
30: 2 steps > a.
Aug. 7: 3 steps > a.
12: = a.
19: id.
23: { < b.
> c.

Sept. 2: 1 step < c.
4: 2 steps < c.
7: { < d.
> e.
9: { half way between
d and e.
11: 2 steps > e.
14: = e.
16: 2 steps < e.
25: 1 step < f.
29: = g.
Oct. 4: invisible ☾.
10: < g.
16: invisible
18: 11 magn.
19: id.
28: invisible.
Nov. 1: id.
10: id.
21: id.
Dec. 23: id.

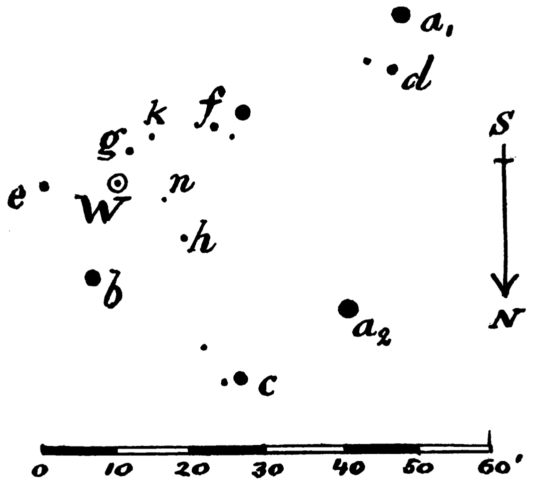
The Stars *f* and *g* by T *Ursæ Majoris*.

I have continued to watch these small stars, which were mentioned in these *Publications,* No. 135, Vol. 23, p. 40. Generally, I noted *f* >*g,* but on October 18th, 19th and November 1st I saw *f* 1 step < *g.* By comparing these dates with those in 1910, on which *f* < *g,* a period of about fourteen days is deduced.

W *Pegasi.*

Jan. 1: W = f.
19: 1 step > e.
23: { < g.
> h.
28: 1 step > g.
29: = g.
Feb. 1: 2 steps < g.
5: 3 steps < h.
7: = g.
27: { < h.
> n.

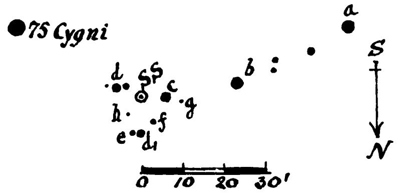
July 11: = e.
23: id.
28: 2 steps < e.
30: id.
Aug. 7: 2 steps > e.
19: = c.
23: id.
26: 3 steps > c.
29: 2 steps > c.
Sept. 2: 3 steps > c.
7: 3 steps < b.



W Pegasi

Sept. 9: 1 step < b.
10: 1 step > b.
14: = b.
16: id.
25: id.
29: 1 step < b.
Oct. 4: 2 steps < b.
8: 3 steps < b.
10: id.
Oct. 16: = c.
18: 2 steps > c.
28: = c.
Nov. 1: 2 steps < c.
10: 3 steps > d.
21: 1 step > e.
Dec. 23: < f.
> g.

SS *Cygni.*



SS Cygni

Jan. 1, 6^h: SS < g.
23, 9^h: invisible.
28, 9^h: = g.
29, 7^h: = h.
< h.
Feb. 1, 7^h: invisible
Feb. 5, 10^h: 2 steps > c.
7, 9^h: = c.
27, 9^h: = g.
Mar. 5, 8^h: id.
May 7, 12^h: id.
21, 13^h: 3 steps < h.

July 11, 12^h: = e.
23, 12^h: = g.
28, 11^h: 1 step < h.
30, 11^h: id.
Aug. 7, 12^h: = g.
20, 10^h: 1 step < h.
23, 10^h: $\left\{\begin{array}{l} < \text{c.} \\ > \text{d.} \end{array}\right.$
26, 11^h: 2 steps > c.
29, 9^h: = c.
30, 9^h: ½ step < c.
Sept. 2, 9^h: 3 steps < c.
7, 9^h: = e.
9, 8^h: $\left\{\begin{array}{l} < \text{e.} \\ > \text{f.} \end{array}\right.$
10, 9^h: = g.
11, 9^h: 1 step < g.
Sept. 14, 8^h: = h.
16, 8^h: id.
25, 10^h: 1 step < h.
29, 9^h: id.
Oct. 4, 9^h: invisible ☾
10, 8^h: < h.
16, 10^h: faint.
18, 8^h: = h.
28, 7^h: $\left\{\begin{array}{l} < \text{d.} \\ > \text{e.} \end{array}\right.$
29, 9^h: 2 steps < c.
Nov. 1, 6^h: $\left\{\begin{array}{l} \text{half way be-} \\ \text{tween c and d.} \end{array}\right.$
10, 8^h, = f.
21, 10^h: faint
Dec. 23, 6^h: 2 steps > c.

Z *Cygni.*[1]

Jan. 1: Z = b.
19: $\left\{\begin{array}{l} = \text{d.} \\ > \text{d.} \end{array}\right.$
23: $\left\{\begin{array}{l} = \text{d.} \\ < \text{d.} \end{array}\right.$
28: $\left\{\begin{array}{l} < \text{d.} \\ > \text{e.} \end{array}\right.$
29: id.
Feb. 1: 2 steps < d.
5: id.
27: 4 steps < e.
Apr. 1: < e.
May 6: invisible.
7: id.
22: very faint.
July 11: = b′.
28: = b.
30: id.
Aug. 20: = b′.
23: id.
29: $\left\{\begin{array}{l} > \text{b}'. \\ < \text{a.} \end{array}\right.$
Sept. 2: id.
7: = b′.
14: = c.
16: 1 step > b.
25: = c.
29: ½ step < c.
Oct. 4: $\left\{\begin{array}{l} < \text{c.} \\ > \text{d.} \end{array}\right.$
8: = d.
16: ½ step > e.
29: 2 steps < e.
Nov. 10: 4 steps < e.
21: invisible.
Dec. 23: id.

U *Herculis.*

Jan. 9: U 3 steps > d.
Feb. 6: = e.
Mar. 19: $\left\{\begin{array}{l} < \text{f.} \\ > \text{g.} \end{array}\right.$
Apr. 1: = g.
14: $\left\{\begin{array}{l} < \text{g.} \\ > \text{h.} \end{array}\right.$
May 6: 3 steps < h.

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[1] Vide the sketch in the *Publications A. S. P.*, No. 100, **17**, 16.

May 7: id.
22: 4 steps < h.
July 28: invisible.
Aug. 20: id.
23: id.
Sept. 2: 4 steps < h.
11: very faint.
14: 5 steps < h.
16: 4 steps < h.
25: 3 steps < h.
Sept. 29: id.
Oct. 18: id.
28: 4 steps < h.
Nov. 1: 3 steps < h.

N. B.—I have used the sketch in the *Publications A. S. P.*, No. 106, **18**, 52, but have added two small neighboring stars, *g* at *a*, and *h* at *f*, both northward.

Y *Tauri* (B. D. + 20° 1083).

On April 8th this irregular variable star was estimated 1 step and on April 14th 2 steps > A = B. D. + 20° 1095 ($7^m.4$), but on several other dates it was only estimated = A or < A.

TV *Cygni*.[1]

This irregular variable star was on March 5th estimated 5 steps and on May 22d only 2 steps > d, but on several dates in September, October and November no variation was perceptible.

S *Persei*.

Jan. 19: S 3 steps > d.
Feb. 5: 1 step < b.
27: = a.
Mar. 5: id.
20: id.
26: 1 step > a.
Apr. 14: = c.
May 6: < c.
> d.
Sept. 7: < e.
> f.
Sept. 11: = f.
16: id.
25: id.
29: id.
Oct. 4: 1 step < f.
18: id.
29: < f.
> g.
Dec. 23: < g.

METEORS.

Fireballs have been observed from stations in Denmark on the following dates: January 12th, February 15th, March 26th, April 7th, May 25th, June 1st, 12th, July 20th, August 5th, September 7th, 10th, 15th, October 8th, 10th, 17th, November 23d.

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[1] Vide the sketch in the *Publications A. S. P.*, No. 135, **23**, 43.

SHOOTING-STARS.

Shooting-stars were observed from five stations in Denmark on August 8th, 9th, 10th, 11th and 12th—namely, by S. A. KIERULFF (Copenhagen), LUDVIG DOLLERIS (Odder), N. H. BOSSEN (Varde), J. SKAKKE (Slettestrand), and THÖGER LARSEN (Lemvig). At these stations 137 paths of shooting-stars were mapped, but only three of them proved suitable for calculation. The fireball on April 7th and the three named shooting-stars have given the following results:—

From Observation.

No.	Time, P. M.	Station	Ending α	Ending δ	Mag.	Observer.
1	Apr. 7, $8^h 26^m$	Aarhus	121°	+31°		CHR. HELSTRUP
		Köge	27	+21.5		J CHRISTENSEN
2	Aug. 12, 10 44	Varde	47	+40	3	N. H. BOSSEN
		Slettestrand	327	+ 5	1	J. SKAKKE
3	Aug. 12, 11 11	Varde	65	+55	2	N. H. BOSSEN
		Slettestrand	303	+ 2	1	J. SKAKKE
4	Aug. 12, 11 49 35^s	Slettestrand	32	+16	1	J. SKAKKE
		Copenhagen F	105	+58.5	4	S. A. KIERULFF

From Calculation.

	Stations			Meteor-Ending			
No.		λ	ϕ	No.	h	λ	ϕ
1	Copenhagen F	0° 3′.5 w.	55° 41′.1	1	16.9	2° 26′.6 w.	56° 5′.8
2	Köge	0 23 .6 w.	55 27 .5	2	59.8	2 16 .5 w.	56 28 .1
3	Varde	4 5 .8 w.	55 37 .2	3	59.8	3 12 .5 w.	56 22 .6
4	Slettestrand	3 12 .8 w.	57 9 .0	4	86.7	0 44 .3 e.	57 5 .9
5	Aarhus	2 21 .8 w.	56 9 .8				

h, the altitude of the meteor above the Earth's surface, is expressed in kilometers; λ is longitude from the observatory at Copenhagen; φ is north latitude.

On August 7th-19th, inclusive, astronomical lectures were delivered at the Carina Observatory in Odder. In the estimations of variable stars I was on some nights assisted by Mr. J. SKAKKE.